

PATENT APPLICATION
Atty. Docket No.: ACI-001 (276/7)

METHOD AND SYSTEM FOR SHARING VIDEO OVER A NETWORK

CROSS-REFERENCE TO RELATED CASE

This is based on and claims priority to and the benefit of Provisional U.S. Patent Application Serial No. 60/147,029, filed on August 3, 1999, the entirety of which is hereby
5 incorporated herein by reference.

TECHNICAL FIELD

This invention relates generally to the distribution of video segments. More particularly,
the invention relates to sharing video in streaming video format over a network.

BACKGROUND INFORMATION

A video can be sent over a computer network as a file attachment to an electronic mail (e-mail) message. With this type of transmission, the entire video file must be transmitted and received before the receiver can view the video. For large files, the time required to complete
15 such transmissions can be longer than the actual playing time of the video. Also, this type of transmission typically requires multiple computer programs to perform all of the necessary functions, including an e-mail application program to send or receive the video in computer file form, and a second program to play or display the video from the received file attachment. With this type of transmission, it is difficult to control the delivery time of the video, and it is difficult
20 to share or forward the received video.

A video can be posted to a World Wide Web ("Web") page. In order to provide a video in this manner, a server computer connected to the Web must be used to host the Web site, and software packages must exist and be used to prepare the video, and transmit it over the Web using the File Transfer Protocol (FTP or ftp) or the HyperText Transfer Protocol (HTTP or http).

- 5 To implement this type of video posting, at least a detailed knowledge of various computer communication protocols is required.

SUMMARY OF THE INVENTION

It is an object of this invention to provide methods and systems for sharing video segments over a network. It is another object of this invention to provide a user with the ability to upload automatically a video segment over a network onto a server, without any specialized skill or knowledge on the part of the user. It also is an object of the invention to store the automatically uploaded video segment either on the server or remotely. The stored segment can then be streamed over the network, for example the Internet, to a receiving computer such that a person at the receiving computer can view the video segment.

In accordance with the present invention, full motion video can be automatically uploaded to a video server and then accessed by any number of viewers after each viewer has been provided with an identifier of the video. The video identifier can in general be an identification tag which identifies where and/or how the video can be accessed, for example a network address, or a universal resource locator ("URL"). The video can also be identified with an image that represents the content or subject matter of the video, so that the video can readily

be identified when held in a collection of videos. Such identifiers as file names that are useful in a computer file processing, storage and retrieval system can further identify the video.

In one aspect, the present invention features a method for sharing video segments and images over a network. The method comprises receiving a video segment and an image identifier generated by a video sender. The video sender uploads the video segment and the image identifier to the video server. The server stores the video segment and the image identifier and creates an identification tag that can be used to access the video segment and the image identifier. The viewer of the video segment and the image identifier uses the identification tag to request delivery of the video segment and the video image. The video segment and the video image can be distributed to the receiver that the viewer is using.

The method can also comprise distributing the video image identifier to multiple receivers as well as serving the video image to multiple viewers.

In another aspect, the invention relates to a system for sharing video segments and images over a network. The system comprises a video server in communication with a video input device for receiving video segments and images and a video output device in communication with the video server for downloading video segments and images.

The video input device can be a Web camera, a personal computer, a laptop computer, a personal digital assistant or PDA, a video cassette recorder or VCR, a video camera, a movie camera, a video game console or any device that can be configured to upload video segments and images to the video server. A video segment can be uploaded to the video server over a network such as the Internet or by the use of wireless communication, or by a combination of both. The

video server can include local or remote storage for storing the uploaded video images. The video output device can be any device that can be configured to allow a user to access and view the video segments and images including but not limited to a television, a computer, a PDA, a video camera, or a video game console. A video segment can be accessed from the video server
5 over a network such as the Internet or by the use of wireless communication, or by a combination of both.

Additionally, the apparatus and method of the invention can include compression techniques to manage large video segments and image files. Video segments and image files can be compressed by the video sender before being uploaded to the server or can be compressed by
10 the server itself. Compression can be used to improve the efficiency of transmission and to improve the use of storage.

In another aspect, the invention involves sending a video segment over a computer network for storage. A video segment is acquired and an identifier is generated. The identifier is associated with the video segment. The identifier can be a single image selected from the video
15 segment. An indicator from a user of a system and/or method according to the invention of an intent to send the video segment over the computer network is accepted and, in response to the indication, the video segment is automatically sent as a machine-readable file together with its associated identifier over the computer network to a receiving computer, thereby allowing the sent video segment and its associated identifier to be stored at the direction of the receiving
20 computer and thereafter streamed out over the network.

In some embodiments, the invention can further involve assuring that the video segment is in a streaming video format, creating an identifier for the video segment, and sending the video

segment and the identifier over the computer network to the receiving computer. The step of assuring that the video segment is in a streaming video format can include determining if a format of the video segment is compatible with a streaming video format, and if the result of the determination is negative, converting the video segment to a temporary, uncompressed video segment in a format that is compatible with a streaming video format. The embodiment also includes the further step of converting the compatible video segment that is present into a streaming multimedia format.

In some embodiments, the identifier for the video segment can be created by storing temporarily a still image or text characteristic of the video segment in streaming multimedia format, the still image or text being encoded in a format suitable for display as a single invariant frame.

In some embodiments, the temporarily stored video segment in streaming multimedia format together with the temporarily stored still image are transferred over the computer network to the receiving computer.

The foregoing and other objects, aspects, features, and advantages of the invention will become more apparent from the following description and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects and features of the invention can be better understood with reference to the drawings described below. The drawings are not necessarily to scale, emphasis instead generally being placed upon illustrating the principles of the invention.

5 FIG. 1 is a schematic embodiment of a process and system according to the invention.

FIG. 2 is an embodiment of a system according to the invention, including the interactions and interrelationships within the system.

FIG. 3 is a functional block and flow diagram of an embodiment of the invention.

FIG. 4 is a login screen on a user's computer, in one embodiment of the invention.

10 FIG. 5 is a record/playback screen as seen by the user, in accordance with an embodiment of the invention.

FIG. 6A is a flow diagram of an embodiment of the invention in which software automates a number of steps in connection with the uploading of a video segment.

15 FIG. 6B is a flow diagram of another embodiment of the invention in which software automates a number of steps in connection with the uploading of a video segment.

FIG. 6C is a flow diagram of an embodiment of the invention in which software automates a number of steps in connection with the formatting of a video segment.

FIG. 6D shows the relationship of some of the files created in the flow diagram of FIG. 6C.

20 FIG. 6E is a flow diagram of a method by which an optimally formatted video segment is sent to a user according to the invention.

FIG. 7 is a screen as seen by the user, the screen indicating that file processing is occurring.

FIG. 8 is an interactive screen used to determine the desires of the individual who sends a video for storage.

5 FIG. 9 is a video playback screen seen by the user.

FIG. 10 is a screen used by the user to control the status of a video queue.

FIG. 11 is a screen used by the user to control the operational settings of equipment associated with the user's computer.

DESCRIPTION

Referring to FIG. 1, a user of the system, such as a private individual working from home, or a professional working from a business, employs a computer system 10. The computer system 10 can include a computer which can be a personal computer of conventional type such as a desktop or laptop computer, a hand held device such as a PDA, or a more powerful computer such as a workstation, a server, a minicomputer, a mainframe, or the like. The computer system 10 can operate software including a web browser such as Microsoft Internet Explorer or Netscape Navigator or Communicator or the like, for communication over a network such as the Internet via the World Wide Web (hereinafter "the Web"), or to permit wireless communication. The computer system 10 can operate software that can manipulate video segment files. The computer system 10 can communicate with video sources, such a video cameras and video recording machines, if the user wishes to employ such sources. Conventional commercially available personal computers typically have sufficient capability to meet these requirements. The

computer system 10 can also employ video segments generated digitally by the computer and appropriate software, or by another computer, if the user wishes to employ such techniques. In one embodiment, the computer system 10 operates a software package called VideoShare Producer 20, which will be described and explained in more detail below.

5 The VideoShare Producer 20 is a software application package that the user can download from the Web site www.VideoShare.com 50 or that the user can obtain in other formats such as on a CD-ROM or bundled with other software or hardware. The VideoShare Producer 20 software can be operated by the user under his control on his computer, in the computer system 10, in order to provide the capability of recording, converting, and optionally, compressing video segments, creating one or more identifiers for a video segment, and transmitting a video segment with one or more of the identifiers to a host computer 60 operating under the control of a host such as www.VideoShare.com 50 for storage at a location under the control of the host computer 60. The host computer 60 will be described further below.

10 The computer in the computer system 10 of the user one can be connected to one or more kinds of equipment for generating video segments, such as a video camera such as a Web cam 12 or another type of video camera such as a professional quality video camera. The computer in the computer system 10 of the user can be connected to one or more kinds of equipment for providing prerecorded video segments, such as a video recorder 14, or another computer that can create digital video segments through the use of suitable software, such as for example digital video segments that have been created for various commercial films, or the like. Once the user has obtained a video segment, and has manipulated it according to the procedures described

below with regard to the operation of the VideoShare software package, or its equivalent, the video segment with one or more identifiers is transmitted to the host computer 60.

The host computer 60 includes one or more server computers 62, 62', 62'' that communicate via a network such as the Web with other computers, such as the computer in the user's computer system 10. The one or more server computers 62, 62', 62'' also communicate with a storage array 64, or optionally with a plurality of storage arrays substantially similar to storage array 64. The storage array 64 can be any convenient storage system, such as a redundant array of magnetic storage disks, one or more readable and writeable CD-ROMs, random access semiconductor memory, any combination of such storage devices, or the like. In one embodiment, the host computer 60 operates the www.VideoShare.com 50 Web site, and provides a video hosting service to one or more users. The host computer 60 can connect via the Web and the web site www.VideoShare.com 50 to one or more computers that comprise the Web, conceptually denoted by the box 70, which, while not a part of the www.VideoShare.com 50 Web site, appears to be transparent to users of the www.VideoShare.com 50 Web site, as well as to viewers of video segments that are being hosted by the host computer 60.

Viewers, or individuals who desire, or are invited, to view video segments hosted on the host computer 60, can access video segments hosted on the host computer 60. As will be described in more detail below, in one embodiment, video segments can be hosted on host computer 60 in areas that are open to the public, or can be hosted in other areas that are open only to viewers who have the appropriate permission or authorization to view a specific video segment. A hosted video segment that is stored and controlled by the host computer 60 may be delivered to and displayed for a viewer in a variety of formats, and through a variety of methods,

as denoted generally by the box 80. In different embodiments, a video segment can be displayed as: a video greeting card 81, such as a person wishing another a happy birthday; as video email 82, as video that can be viewed on a remote website 83 (e.g., a video segment embedded into the remote website so that a viewer who visits the remote website sees the video segment as part of the page that is presented); as video commerce 84, for example a video that depicts a person describing his or her experience and training as part of a resume submitted on-line; or as a video advertisement 85, for example a video depicting the benefits or showing the use of a product. Many other like applications of the technology can be envisioned. In various embodiments, the video segment can be made available to the viewer as a streaming video that is sent to the viewer, or may be made available by sending the viewer a message such as an email that contains an address of a location to visit on the Web (e.g., a Universal Resource Locator, or URL), or may be made available by sending the viewer a message that contains an embedded link to a URL, for example by sending an e-mail containing the link or by sending a still image that may have some interest to a viewer (e.g., sending a grandmother a still image of her grandchildren) to which a link is attached (e.g., the still image is linked to a streaming video of the grandchildren that is delivered and that plays when the still image is clicked). In the latter two methods of making a video segment available, or in like methods, the viewer must take some action, such as employing the URL or activating the link. In some embodiments, the viewer can use a hand held device such as a PDA or a cellular telephone that can connect to a network such as the Internet to view the video segment.

In FIG. 2, the computer 16 of the user's computer system 10 is shown. The box 18 is intended to schematically depict a user of a computer video input device, which device can be the

computer 16 operating suitable software to generate digital video, or can be another such computer, or can be the web cam or video camera 12, or can be the video recording device 14, or the like. The user begins by producing and/or recording a video segment on the hard disk of the computer 16 or within the temporary memory of a handheld device. As a second step, the video segment of step 1 can optionally be compressed and /or can be changed as regards the computer file format in which it is recorded on the hard disk. As a third step, the video segment recorded on the hard drive of the computer 16 is transmitted with one or more identifiers to the host computer 60 that includes the VideoShare servers 62, 62' and the storage array 64. The video segment is stored under the control of the host computer 60, which can generate an identification tag that the host computer 60 can use to locate the stored video segment for retrieval and for viewing. In different embodiments, the identification tag can be provided to a user in the form of a URL, or can be embedded into a Web page on a remote site, or can be linked to a message. In one embodiment the message can be a still image that can be selected from the video segment. The third step is schematically depicted by the arrow pointing generally from the computer 16 to the VideoShare servers 62, 62'. As a fourth step, the user who stored the video can send a message to an intended viewer, so that the viewer can access and view the video segment. The fourth step is schematically depicted by the arrow pointing generally from the computer 16 to the computer 90 of the viewer. The box 92 is intended to schematically depict a user of a display device. In one embodiment, the display device can be the computer 90, or the display device can be a display device such as a Web TV, or can be a video output device such as a television set with a suitable decoder, or the like. The display device can also be a wireless hand held device such as a PDA or a cellular telephone or the like. In a fifth step, the viewer activates the viewing

of the video segment. The viewer's action is indicated schematically by the arrow pointing generally from the computer 90 to the server computer 62, 62'. In one embodiment the viewer activates a link by clicking a button, and the server computer 62, 62' responds by sending a streaming video segment that the viewer observe. The streaming video segment can in one
5 embodiment be delivered as part of a video greeting card 81. In an alternative embodiment, the video can be delivered as a streaming video directly to the viewer from the host computer 60, without the viewer having to activate the host computer 60.

As shown in FIG. 3, the user can obtain a copy of the VideoShare Producer 20 software by downloading a copy of the software from the Website www.VideoShare.com 50, as indicated by the picture at numeral 1. Alternatively, the user can obtain a copy of the VideoShare Producer 20 software on machine readable media such as a CD-ROM or the like. The VideoShare Producer 20 software can be bundled with one or more utility or application programs that are useful for a user to have, such as a "container" application so that the VideoShare Producer 20 software can be operated on a desktop computer. The user can install the VideoShare Producer 20 software on his or her computer 16 and can register with the VideoShare.com hosting service
10 at no charge. In registering for the VideoShare service, the user obtains a username and a password that can be used to identify the user. The activity of installing the VideoShare Producer 20 software on the user's personal computer or the like and registering with the VideoShare system is indicated by the picture at the numeral 2.

20 In order to use the system, the user first obtains a video segment. The user can create the video segment, for example with a Web cam 12, or the user can use an existing video segment obtained from a video recorder 16, as indicated by the picture at the numeral 3. The VideoShare

Producer 20 software has direct capture capabilities that permit the user to create the video segment.

The user can employ the VideoShare Producer 20 software to optionally compress the video; to determine if a video segment is in a format that is compatible with streaming video; to
5 convert the video to a file format that is compatible with streaming video if the video segment is not already in a file format that is compatible with streaming video; and to transmit the video segment together with one or more identifiers that represent selections that the user can make (for example, a still image selected from the series of images that comprise the video segment, an identifier of the sender of the video segment (e.g., the user), an access privilege associated with the video segment, information indicative of a time period during which the video segment will be accessible, and information indicative of a number of instances that the video segment may be accessed). The activities carried out in conjunction with the VideoShare Producer 20 software are generally indicated by the graphic at numeral 4.

The video segment and the identifier(s) are transmitted to the host computer 60 for storage and for later distribution. In one embodiment, the video segment is transmitted in a streaming video file format. This transmission activity is denoted by the graphic at numeral 5.

The video segment is stored under the control of the host computer 60, which can include one or more server computers 62 and storage array 64. The activity of receiving the video segment at the host computer 60 and storing the video segment and its identifier(s) is denoted by
20 the pictures at numeral 6.

Depending on the choice of the user as to access privileges, the video segment can be stored as a publicly available video in a location in storage array 64 that has no restrictions on

access, or it can be stored in a portion of storage array 64 that requires some form of authorization to enable access, such as in a private email account area. The storage of the video segment as a public or private video segment is denoted by the pictures at numeral 7.

Upon request from a viewer who has the proper authorization, or upon any request in the case of a video segment available publicly, the host computer 60 sends the video in streaming video format to a viewer, who can observe the video in real time using a conventional web browser without additional plug-in modules. The activity of serving the video segment as a streaming video is denoted by the graphic at numeral 8.

The majority of the VideoShare Producer 20 software was developed as a Windows 95, Windows 98, and Windows 2000 ("Windows 9x/2000") compatible ActiveX control (e.g. an .OCX file), with additional components existing as active template library (ATL) component object model (COM) components that are instantiated during runtime. A "container application," named "VideoProducer.exe," allows the VideoShare Producer ActiveX Control to be executed from the Windows 9x/2000 desktop. The VideoShare Producer Active X Control can also be embedded into a web page, as is done within the www.VideoShare.com 50 web site.

The custom written VideoShare Producer 20 software includes the following binary/source code components: (1) VideoShare Producer ActiveX Control (VideoProducer.ocx); (2) JPEG ATL COM component (jpeg.dll); (3) Thumbnail Acquisition DirectShow (ThumbnailFilter.ax); (4) Extended MAPI interface (MapiExAPI.dll); (5) ICQ interface (icqglue.dll); AND (6) VideoShare Upload/Database Server (vpserver.exe).

All components, except for significant portions of the JPEG component that uses public domain source code, were entirely written by VideoShare Inc. The VideoShare Upload/Data

Server constantly runs at the VideoShare Hosting Facility, an embodiment of the host computer 60, with which an installed instance of the VideoShare Producer 20 software on a user's computer 16 can be in constant communication. The VideoShare Producer 20 software client/server structure allows the user to upload videos to his or her account through the "Save and Share" button that is described later.

The VideoShare Producer 20 software is built upon the following third-party technologies that provide lower-level device support, document sharing, and file format conversion: (1) Microsoft's DirectShow; (2) Microsoft's Windows Media Technologies; (3) Microsoft's Video for Windows; (4) MAPI; AND (5) ICQ.

When the user launches the VideoShare Producer 20 software, he or she will see the window depicted in FIG. 4 appear on his or her computer 16 operating the Win9x/2000 operating system. The login screen can be made optional for repeat users by providing a unique identifier for the user, such as a password, or by installing on the user's computer or the like a record similar to the "cookies" used by some interactive computer systems operating on a network such as the Internet.

When the user enters in his or her username in the box 410 labeled VideoShare Login Name and his or her password in the box 415 labeled VideoShare Password and activates the "Start VideoShare Producer" button 420, the VideoShare Producer 20 software opens a TCP/IP socket connection to the VideoShare Upload/Database Server via port 80 in order to avoid typical Firewall and/or Proxy Server problems. If the box 430 labeled Remember password is checked, the VideoShare Producer 20 software will remember the user's password, eliminating the necessity to type in that information each time the software is started. The VideoShare

Upload/Database Server then verifies the validity of the username/password. Furthermore, the VideoShare Producer 20 software will notify the user if there is a more recent version of the software available, giving him or her the opportunity to automatically download and install the new software.

5 Also at this point, the user can choose to work offline by checking box 440 "Work offline", which suspends communications to the VideoShare Upload/Database Server until the user has filled his or her "Sharing Queue" as described later. The ability to work offline is principally of use for people with computers that do not have a continuously open Internet connection, e.g. computers that use telephone modems rather than high speed connections or equipment such as cellular telephones or hand held devices that require the user to dial in to establish a connection. With this login dialog, the user can also receive help, by activating the "Help" button 450, taking the user to a web page on the VideoShare web site. The login dialog box can also be used to create a new VideoShare user account, by clicking the "Create Another Account" button 460.

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5 Once the login process has been completed, the VideoShare Producer 20 software looks for available DirectShow audio and video capture devices. These available devices are enumerated and listed within the "Settings Tab" as described later. The VideoShare Producer 20 software initializes the audio and video capture device, by recalling as a default the device that was used most recently.

20 **VideoShare Producer Preview/Capture/Import Process**

After the capture device initialization, the VideoShare Producer 20 software displays the window depicted in FIG. 5.

The image 510 in the middle of the window is the video input stream from the initialized, default video capture source. The image in FIG. 5 is that of an employee of the assignee of the present invention, in the offices of the assignee. The VideoShare Producer 20 software automatically builds a DirectShow "preview graph" where the video stream from the video device is displayed on the screen, but is not saved to disk. This gives the user the opportunity to adjust the camera, e.g. an opportunity to correct the camera position, the camera focus, the camera angle, the magnification of the image, and the like.

At the top of this window, the user is presented with five different "tabs", each presenting the user with different aspects of the VideoShare Producer 20 software. In FIG. 5, the tab labeled "Record/Playback" 520 is active, indicating that the VideoShare Producer 20 software is ready to acquire and/or display a video segment.

At the bottom of the window, there is a status message 522 that displays the current operation of the VideoShare Producer 20 software. In FIG. 5, the status message 522 prompts the user to either activate the Record button 531 to create a new video segment, or to import an existing video segment by activating the Import Video button 535, both of which are described in more detail below.

Directly below the video preview image 510 is a Capture/Playback Control Panel 530 that includes the following items:

- Record button 531 which begins a new audio/video capture;
- Stop button 532 which terminates an active audio/video capture operation;
- Play button 533 which initiates the playing back of the last recorded or imported video;

- Delete button 534 which cancels the last record or import operation and begins a new video preview;
- Import Video button 535 which allows the user to select a pre-existing video file from his or her hard drive;
- 5 - Save and Share button 536, which in the present embodiment activates software modules that convert the current video file into a compressed streaming format, upload that converted file to the VideoShare web site, and give the user options to distribute that video to other people; and
- Shuttle Bar 537 which is used to control the current position of the playback file together with forward button 537 and reverse button 538, allowing the user to rewind and fast forward through the current video.

The software modules that operate upon the activation of Save and Share button 536 will be covered in a subsequent section in this document in detail.

When the user begins to record a video, the VideoShare Producer 20 software builds a new "Capture Graph" that renders the video stream to both the display window as well as to a temporary .AVI file on the user's hard drive. The audio/video capturing continues until the user activates the "Stop" button 532 at which point the VideoShare Producer 20 software stops the "Capture Graph", destroys the DirectShow filter, builds a Direct Show "Playback Graph", and displays the first frame of the captured video as video preview image 510. When the user
20 activates the Play button 533 the DirectShow "Playback Graph" is put into running mode, playing back the entire recorded video from beginning to end.

The user can also choose to import a pre-existing video, which in one embodiment can be a file format selected from the AVI, MPEG, or QuickTime file formats, by activating the Import Video button 535. The VideoShare Producer 20 software automatically renders the correct DirectShow filter to display an imported video correctly.

5 **Save and Share Process**

Once a video segment has been recorded or imported into the user's computer 16 that is running the VideoShare Producer 20 software, the user can choose to process the video segment with various optional alternatives by activating the Save and Share button 536. When the Save and Share button 536 is activated, the video segment is archived and distributed automatically.

0 The VideoShare Producer 20 software greatly simplifies the entire process by seamlessly automating the following steps that are depicted in FIG. 6A:

- Video file format conversion, as required;
- Compression to a streaming multimedia format at a user-specified bitrate;
- Creating a "Thumbnail" JPEG snapshot of the video file, as an identifier that a user or a viewer can observe in order to assess the content of the video segment;
- Transferring the resultant video and thumbnail files to the VideoShare server computers 62, 62';
- Logging the transactions and managing the user's storage account, including causing the generation of an identification tag that the server computers 62, 62' can employ to retrieve the video segment for viewing; and
- Automating several possible methods of distributing the video to third party recipients, e.g., viewers.

FIG. 6A shows a flow diagram 600 of an embodiment of the invention in which the VideoShare Producer 20 software automates a number of steps in connection with uploading a video segment by activation of the Save and Share button 536 described in FIG. 5. As indicated at box 605, a user first obtains and selects a video segment for processing for distribution. The box 605 schematically encapsulates all of the actions that a user takes as described in relation to FIGs. 4 and 5 above. When the user activates the Save and Share button 536 the actions described below that are enclosed by the dotted line 607 are automatically carried out under the control of the VideoShare Producer 20 software.

The VideoShare Producer 20 software subjects the selected video segment to analysis to determine whether the selected video segment is or is not in a file format that is compatible with a streaming video format, as indicated at diamond 610. Formats that are compatible with streaming media formats include formats such as MPEGs and QuickTime videos. If the selected video segment is not compatible with a streaming video format, it is converted to a compatible format, as depicted by the arrow labeled "NO" that points from the diamond 610 to the box 615, "Convert to compatible file format." The conversion process performed by the VideoShare Producer 20 software creates a DirectShow filter graph that decompresses the video file into a temporary, uncompressed AVI file.

The video segment file in a format that is compatible with streaming video is then temporarily stored in the user's computer 16, for example as a file on the hard drive of computer 16. This storing step is performed if the file was originally in a format compatible with streaming video by following the arrow marked "YES" that points from the diamond 610 to the box 620, "Temporarily store file." Alternatively, the storing step is performed if the file was

originally not in a format compatible with streaming video by following the arrow that points from the box 615 to the box 620.

The stored temporary file representing the selected video is then analyzed by the VideoShare Producer 20 software, as represented by diamond 625, "Should file be compressed?"

5 to determine if the temporarily stored file should be compressed. If the software determines that the file should be compressed, as indicated by the arrow labeled "YES" that points from the diamond 625 to the box 630, labeled "Compress file," the file is compressed. The compression involves compressing the video file to a user-specified bitrate, or the bandwidth that is required to view the video without disruption in the transmission. The user can select the desired bitrate via the "Settings Tab" that is described in more detail below.

005020 "020300
The file is then converted to a streaming multimedia format file as indicated by the box 635, labeled "Convert file to streaming multimedia format ("SMF") file," as denoted by the arrow pointing from the box 630 to the box 635. If the file is not to be compressed, the flow follows the arrow labeled "NO" pointing from the diamond 625 to the box 635, and the file is then converted to a streaming multimedia format file as schematically represented by the box 635.

20 The process that is performed by the VideoShare Producer 20 software as denoted by the box 635 involves reading in the video file, frame by frame, and converting the video into a streaming multimedia format. In one embodiment, the VideoShare Producer 20 software uses the Windows Media Streaming Format, known as ASF or WMF, but it is not technologically restricted to this choice. The Windows Media Streaming Format comprises MPEG 4 v3 for the

video stream and the Windows Media Audio format for the audio stream. The output of this file is stored as a temporary file on the user's hard drive, in one embodiment.

The flow diagram indicates that the process makes a "thumbnail" of the video file, as represented schematically by the box 640, labeled "Create and temporarily store JPEG

5 "thumbnail" identifier." The VideoShare Producer 20 software produces a JPEG still image that is used as a reference image to the entire video file. It is an identifier of the subject matter or content of the video that a user or a viewer can readily recognize, as compared to an alphanumeric string such as a typical string used to identify a file by its drive, directory (and one or more subdirectories) and filename. Such alphanumeric identifiers are useful, but may be totally uninformative as to the content or subject matter contained in the identified file or video segment. In one embodiment, the VideoShare Producer 20 software creates the "thumbnail" by taking the "middle" image of the entire video file, as measured by the temporal duration of the file. In another embodiment, the selection of an image from which to make the "thumbnail" can be left to the discretion of the user. This JPEG file is also stored as a temporary file on the user's hard drive, in one embodiment.

The next part of the process is the upload operation, in which the VideoShare Producer 20 software contacts the host computer 60, which in one embodiment is the VideoShare Upload/Database Server at the VideoShare hosting facility. This portion of the automated process is denoted by the box 645 labeled "Transfer ("upload") temporarily stored SMF file and 20 JPEG thumbnail identifier to host computer 60." The VideoShare Producer 20 software notifies the host computer 60 that the user wishes to place his or her video into a repository maintained by the host computer 60, which in one embodiment can be the VideoShare VideoCenter, which is

5 a repository of all recorded and uploaded videos to date. This upload is performed automatically via a direct TCP/IP socket connection over a specific connection port of the user's computer known as port 80. The VideoShare Producer 20 software uses a standard communications protocol to perform this transfer to the host computer 60. In another embodiment, a proprietary protocol can be used, for example if one wants to maintain the security of information contained in the video segment. In another embodiment, the video segment can be encrypted in order to provide enhanced security. Both the compressed video streaming multimedia file and the thumbnail image are uploaded at substantially the same time.

As schematically depicted by box 650, labeled "Delete temporary file to conserve storage space on user's computer," the VideoShare Producer 20 software removes all of the temporary files that were created in the course of the automated processing described above. This feature provides for the user a convenient, secure, and transparent process, with the benefit that the user's computer storage device(s), for example one or more hard drives, do not become cluttered with unnecessary and obsolete files.

Once the upload has been completed, the VideoShare Producer 20 software and the host computer 60 (for example, the VideoShare Upload/Database Server) will update the user's account to account for the required storage space that the video requires. The necessary logging, creation of an identification tag, and storing of the video and the associated identifier or identifiers is also performed automatically, as schematically depicted by box 655.

20 The user can optionally add additional identification and control information about the user, and about how and under what conditions the video is to be made available for distribution, as schematically indicated by box 660. The process by which some of this information is

collected is discussed below with regard to FIG. 8. The user is automatically prompted to provide this information, but has the option to forego making a decision immediately. The transmission of video segment files to viewers is discussed in more detail below, and is represented in FIG. 6 by the box 670 labeled "Transmit file to viewer" which is outside the region 607 as an indication that the transmission of files to viewers is an action beyond the material discussed above in conjunction with the Save and Share button 536 of FIG. 5.

FIG. 6B shows a flow diagram 601 of another embodiment of the invention in which software automates a number of steps in connection with uploading a video segment. Many of the steps already described in connection with FIG. 6A also occur in the embodiment depicted in FIG. 6B, and are numbered in the same manner as in FIG. 6A. In FIG. 6B, there is first an optional step indicated by the box 604 labeled "Optional: User authentication with server" in which the User is optionally required to provide identification, such as a user name and password, that authenticates the identity of the user to the server or host computer 60. The user then obtains and selects a video segment for processing for distribution, as indicated at box 605 that schematically encapsulates all of the actions that a user takes as described in relation to FIGs. 4 and 5 above. When the user activates the Save and Share button 536 the actions described below that are enclosed by the dotted line 608 are automatically carried out under the control of the VideoShare Producer 20 software.

As discussed in relation to FIG. 6A, the VideoShare Producer 20 software subjects the selected video segment to analysis to determine whether the selected video segment is or is not in a file format that is compatible with a streaming video format, as indicated at diamond 610. If the selected video segment is not compatible with a streaming video format, it is converted to a

compatible format, as depicted by the arrow labeled "NO" that points from the diamond 610 to the box 615, "Convert to compatible file format." The conversion process performed by the VideoShare Producer 20 software creates a DirectShow filter graph that decompresses the video file into a temporary, uncompressed AVI file.

5 The video segment file in a format that is compatible with streaming video is then temporarily stored in the user's computer 16, for example as a file on the hard drive of computer 16. This storing step is performed if the file was originally in a format compatible with streaming video by following the arrow marked "YES" that points from the diamond 610 to the box 620, "Temporarily store file." Alternatively, the storing step is performed if the file was
10 originally not in a format compatible with streaming video by following the arrow that points from the box 615 to the box 620.

 The stored temporary file representing the selected video is then analyzed by the VideoShare Producer 20 software, and optionally compressed as represented by the box 623 labeled "Optional compression of file." The file is then converted to a streaming multimedia
15 format file as indicated by the box 635, labeled "Convert file to streaming multimedia format ("SMF") file." Alternatively, a file from the box 620 can be uploaded to the host computer 60 without being converted to a streaming format, and the conversion to a streaming video format can be accomplished at the host computer 60. The process that is performed by the VideoShare Producer 20 software as denoted by the box 635 involves reading in the video file, frame by
20 frame, and converting the video into a streaming multimedia format.

The flow diagram indicates that the process makes a "thumbnail" of the video file, as represented schematically by the box 640, labeled "Create and temporarily store JPEG "thumbnail" identifier."

The next part of the process is the upload operation, in which the VideoShare Producer 20 software contacts the host computer 60, which in one embodiment is the VideoShare Upload/Database Server at the VideoShare hosting facility. This portion of the automated process is denoted by the box 645 labeled "Transfer ("upload") temporarily stored SMF file and JPEG thumbnail identifier to host computer 60." Both the compressed video streaming multimedia file and the thumbnail image are uploaded at substantially the same time.

As schematically depicted by box 650, labeled "Delete temporary file to conserve storage space on user's computer," the VideoShare Producer 20 software removes all of the temporary files that were created in the course of the automated processing described above. This feature provides for the user a convenient, secure, and transparent process, with the benefit that the user's computer storage device(s), for example one or more hard drives, do not become cluttered with unnecessary and obsolete files.

Once the upload has been completed, the VideoShare Producer 20 software and the host computer 60 (for example, the VideoShare Upload/Database Server) will update the user's account to account for the required storage space that the video requires. The necessary logging, creation of an identification tag, and storing of the video and the associated identifier or identifiers is also performed automatically, as schematically depicted by box 655.

The user can optionally add additional identification and control information about the user, and about how and under what conditions the video is to be made available for distribution,

as schematically indicated by box 660. The process by which some of this information is collected is discussed below with regard to FIG. 8. The user is automatically prompted to provide this information, but has the option to forego making a decision immediately. The transmission of video segment files to viewers is discussed in more detail below, and is represented in FIG. 6B by the box 670 labeled "Transmit file to viewer" which is outside the region 608 as an indication that the transmission of files to viewers is an action beyond the material discussed above in conjunction with the Save and Share button 536 of FIG. 5.

FIG. 6C shows a flow diagram 602 of an embodiment of the invention in which software automates a number of steps in the formatting of a video segment. In particular, in this embodiment, the video segment that the user wishes to provide in streaming video format is compressed into a plurality of formats, each of which is encoded for optimal display at a different transmission bitrate. There can be a benefit to recording the same video segment in multiple formats. For example, a casual viewer may have only a slow speed modem, such as a 28.8 kilobaud (kB) modem. For such a viewer, the slow transmission speed can make the size of a file a critical feature. Such a user can view a video in real time if it is formatted for a 28.8 kB modem, but not if it is formatted for appreciably higher transmission speeds. Another user, for example, one who has a T1 connection that can handle transmission speeds up to approximately 1.5 megabaud, could successfully receive a version of the same video segment that is formatted for higher transmission speeds, with the possibility of having a better quality image and higher resolution, perhaps with better audio as well. The T1 user could see the version of the video segment intended for 28.8 kB transmission if he or she wanted to, but might prefer to see a video segment that appeared to be more professional in quality. By using a system that can

automatically discriminate the transmission speed capabilities of the hardware that the user employs, the embodiment allows each user to view a version of the video segment that is optimally configured for the user's hardware.

In particular, the steps of the method enclosed within the dotted rectangle 609 are automated by software that embodies the present invention. As described above, the user obtains and selects a video segment for processing for distribution, as indicated at box 605 that schematically encapsulates all of the actions that a user takes as described in relation to FIGs. 4 and 5 above. When the user activates the Save and Share button 536 the actions described below that are enclosed by the dotted line 609 are automatically carried out under the control of the VideoShare Producer 20 software.

As discussed in relation to FIG. 6A, the VideoShare Producer 20 software subjects the selected video segment to analysis to determine whether the selected video segment is or is not in a file format that is compatible with a streaming video format, as indicated at diamond 610. If the selected video segment is not compatible with a streaming video format, it is converted to a compatible format, as depicted by the arrow labeled "NO" that points from the diamond 610 to the box 615, "Convert to compatible file format." The conversion process performed by the VideoShare Producer 20 software creates a DirectShow filter graph that decompresses the video file into a temporary, uncompressed AVI file.

The video segment file in a format that is compatible with streaming video is then temporarily stored in the user's computer 16, for example as a file on the hard drive of computer 16. This storing step is performed if the file was originally in a format compatible with streaming video by following the arrow marked "YES" that points from the diamond 610 to the

box 620, "Temporarily store file." Alternatively, the storing step is performed if the file was originally not in a format compatible with streaming video by following the arrow that points from the box 615 to the box 620.

The temporarily stored file is then compressed in multiple streaming multimedia formats, as denoted by the box 633. In the present example, three files will be used to describe the process, but it should be understood that more or fewer than three formats may be created at substantially the same time. The resulting multiple files are denoted by the three boxes 634, 636 and 638 labeled "Bandwidth Target A," "Bandwidth Target B," and "Bandwidth Target C," respectively. Each file is optimally encoded for play as a streaming video segment at a particular transmission rate and bandwidth, such as 28.8 kB, 56 kB, 100kB, 300kB, or other transmission rates.

As described above, the method includes a step of creating and temporarily storing a "thumbnail" identifier, as denoted by the box 640. Rather than transmitting one video segment in one SMF with one thumbnail, the embodiment of FIG. 6C transmits all the files 634, 636 and 638 in association with the single thumbnail and any other identifiers that are selected as appropriate. For example, each SMF file can be identified as to its bandwidth. In an alternative embodiment, the system transmits only a single SMF file with its associated identifiers, including the JPEG "thumbnail," and the multiple bandwidth variants of the SMF file are generated at the host computer 60. This embodiment may be advantageous when the user has only a slow speed modem, and would be severely time constrained by having to upload multiple files.

The remaining steps of this embodiment, as denoted by the boxes 650, 655, 660 and 670, correspond substantially to the steps in FIG. 6A represented by the boxes identified with the

corresponding numerals. It should be noted that the precise order of some of the steps, for example, the step denoted by the box 655 and the step denoted by the box 650, can be interchanged without a different outcome of the overall process. Other such interchanges in sequence are possible as well, again without a different outcome of the overall process.

5 FIG. 6D depicts an embodiment of the database 64 of the host computer 60 on which are recorded the three exemplary bandwidth target files 634, 636 and 638 for FIG. 6C. These files are available for delivery over a computer network to a viewer. The files 634, 636 and 638 represent three versions of the same video segment in streaming multimedia format, each suitable for optimal viewing by a user having hardware operating at the transmission rate corresponding to the format of one of the files.

10 As shown in FIG. 6E, the user (or the viewer) transmits to the host computer 60 a request for a particular video segment, denoted by the arrow from the box labeled "USER" to the box 960 labeled "Connection Speed Detector." Host computer 60 can include hardware that can sense the transmission speed of a user computer 16, or of a computer used by a person desiring to view a video segment. Alternatively, the host computer 60 can inquire of the computer on the network that is connected to the user computer 16 or the computer of a viewer about the speed of connection that is being maintained. When the information is available to the host computer 60, the host computer 60 can determine which file of the files exemplified by 634, 636 and 638 is most appropriate to serve to the user or viewer, as denoted by the box 692 labeled "Logic to
15 select and serve SMF file to User." The host computer 60 then transmits the appropriate file to the user, as denoted by the arrow from the box 692 to the box 694 labeled "User receives and
20

views SMF file.” Alternatively, the viewer can request the transmission of a file encoded at a specific bitrate.

When the user begins the process described in relation to FIG. 6A, in one embodiment, the “Progress Dialog” screen 700 depicted in FIG. 7 is presented, reflecting the status of the process in real time. The “Progress Dialog” screen 700 notifies the user about the total number of bytes that have to be uploaded to perform the transfer and it also informs the user of the number of bytes and the percentage of the file that have been uploaded in real time.

FIG. 8 depicts a dialog panel 800 presenting several methods with which the user can distribute the uploaded streaming video segment and its associated identifiers to third party recipients. The dialog panel 800 prompts the user as to the possible selections that the user can elect.

In one embodiment, there are five possible methods to distribute the video file:

The user can elect to use an email browser to send an email to one or more people that includes a URL reference to the video located on the VideoShare web site. This also includes the further possibility to send the video player directly embedded inside the email message. This option is elected by activating the button 810, labeled “Share as a video mail.”

The user can elect to share the video as a greeting card, bringing the user to the Video Greeting Card web page at the VideoShare web site. In this case, the user will also select features relating to the greeting card. The user can elect this option by activating the button 820, labeled “Share as a video greeting card.”

The user can elect to send an ICQ URL message, automatically interfacing with ICQ's Instant Messenger software. The user can elect this option by activating the button 830 labeled "Share through ICQ Messaging."

The user can elect to go to the user's VideoCenter page on the VideoShare web site, from which location the video can also be shared or sent to others. The user can elect this option by activating the button 840, labeled "Take me to my VideoCenter."

The user can elect to place HTML code in the user's clipboard that references the video. This HTML code can be "pasted" into any Web page that supports HTML inserts. The user can elect this option by activating the button 850, labeled "Put HTML code in my clipboard." In one embodiment, this option allows a user to paste a video into a Web page, for example to demonstrate the use of a product for sale, or to present a personal greeting to visitors to the Web page.

By electing to activate the button 860, labeled "Nothing, I'll share this video later," the user can postpone making an election regarding the sharing of the uploaded video segment.

The above options are discussed in more detail below.

Sharing the video via email will bring up the user's default email browser, such as Outlook, Netscape Communicator, Eudora, etc. This is accomplished through the use of MAPI technologies that allow for document exchange on Win9x/2000 systems. A user who employs Netscape Communicator or Microsoft Outlook will be able to directly embed the Windows Media Player inside the email text body, allowing the recipient to directly play the video from his or her email browser. In one embodiment, this "embedded video mail" feature causes a window

such as that depicted in FIG. 9 to appear, for example when the user is using Microsoft Outlook for e-mail service.

As shown in FIG. 9, at the top of the email message, the VideoShare Producer 20 software will display the Windows Media Player 910 with the sender's recorded video pre-loaded. The recipient of this embedded video mail only needs to activate the play button 920 on the Windows Media Player to see the video segment, rather than going to a URL hyper-link. The embodiment includes the conventional dialog boxes for entry of an email address for a recipient (box 902), a "carbon copy" ("cc") address (box 904), and a subject (box 906). In the embodiment shown, instructions are presented below the Windows Media Player 910 for the convenience of the recipient.

The two options "Share as a Video Greeting Card" and "Take me to my VideoCenter" causes the VideoShare Producer 20 software to spawn off a Web browser and automatically jump to one of these two pages on the VideoShare Web site. The user can define the features of a video greeting card, and can direct the card as an e-mail to a viewer. Alternatively, the user can define a recipient list for the video segment as a single item to be viewed, and can send the video to the locations on the list.

The "Share Through ICQ Messaging" button 830 can bring up ICQ's Instant Messenger software, if it is installed on the user's machine, and can initiate a "URL Message" construction automatically. The VideoShare Producer 20 software can automatically fill out the URL that references the playback of the user's video. The recipient of this URL Message can view the video by clicking a mouse on the URL to be taken directly to the VideoShare web site, where the video can be displayed.

The "Put HTML code in my clipboard" button 850 can place a section of HTML code that, when the user pastes this code in a web page, causes the Windows Media Player to automatically instantiate a video playback of the message. This feature enables the user to place this video in any system that supports HTML code, such as personal web pages, online auction sites, online job boards, and the like.

Working Offline and the "Sharing Queue"

The VideoShare Producer 20 software also allows the user to "work offline." Offline means that the VideoShare Producer 20 software will not communicate with the host computer 60 (for example, the VideoShare Upload/Database Server) until the user explicitly uploads one- or-more videos via a "Sharing Queue". This Sharing Queue appears to the user as one of the main tabs in the VideoShare Producer 20 software and acts as a temporary queue for recorded/imported videos. "Work offline" allows the user to not make an Internet connection until he or she is ready to upload more than one video at a time. This mode of operation is useful for modem users who incur considerable expense for extended dial-in times or people who are using laptops and are not always near an Internet connection outlet.

FIG. 10 shows a screen 1000 used to control the status of a video queue. When the user, after recording or importing a video, clicks the "Save and Share" button 536 of FIG. 5 while in "offline mode", the VideoShare Producer 20 software performs the first three steps of the "Save and Share Process," namely, the video file format conversion represented by box 615 of FIG. 6A, the compression of the video segment to a streaming multimedia format at a user-specified bitrate represented by the box 635 of FIG. 6A, and the creation of a "Thumbnail" JPEG snapshot of the video file represented by the box 640 of FIG. 6A. The resulting output files are stored in a

local database for later use in the "Sharing Queue," which is an operation similar to the temporary storage of files depicted in FIG. 6A. In the middle of FIG. 10 is a dialog box 1010 that displays a list of video segments that are ready to be uploaded to the VideoShare Web site. The small "Preview" window 1020 in the upper left corner of FIG. 10 is a DirectShow playback graph that allows the user to review the stored video segment that is highlighted in the dialog box 1010. The user can use this window to preview the video segment file by activating the "Preview" button 1030, to delete the video segment file by activating the "Delete" button 1040, and to upload and publish the video by activating the "Save and Share Now" button 1050.

The "Save and Share Now" button 1050 performs the uploading process on each of the queued videos, creating a TCP/IP connection to the VideoShare Upload/Database Server, transferring the file to the VideoShare web site, and updating the user's VideoShare account, in a manner substantially similar to the method employed by the Save and Share button 536 of FIG. 5 to accomplish the same activities.

Audio/Video Setting Process

FIG. 11 shows a screen 1100 used to control the operational settings of equipment connected to the user's computer. Another feature of the VideoShare Producer 20 software is the ability of the user to change the configuration of the audio, video, and compression devices through the use of the "Settings" tab 1110. Upon activation of the Settings tab 1110, the screen 1100 is active.

The user can select the "bitrate" at which the streaming multimedia files will be compressed by using the set of radio buttons 1120 at the upper left corner of the screen 1100. The default setting is "56k Modem" which corresponds to a user using a 56k modem. This

default setting is denoted by the 56k Modem radio button 1120 appearing with a dot, while the remaining radio buttons for bitrate 1120 are blank. In one embodiment, the pie graph 1130 that appears at the upper right corner of screen 1100 indicates the percentage of the user's VideoShare storage space that is full. In the embodiment shown, the user has filled approximately 3.13% of the available storage capacity available for storing files. Two pull-down menus, "Camera source device" box 1140 and "Audio source device" box 1150, list all of the available video and audio capture sources that the user has available on his or her Win9x/2000 machine. The user can select a source of audio or video by activating the appropriate pull-down menu box and locating a device of his or her choosing. To the right of these pull-down menus, there are two buttons, "Video Settings..." 1160 and "Audio Settings..." 1170 that allow the user to change the properties of the currently selected audio and video device. Such properties include image size, capture compression, lighting conditions, and the like. The screen 1100 also provides to the user the current working directory information in a the box 1180 and the current queue directory information in the box 1190, which the user can optionally change by entering new values in either or both boxes 1180 and 1190.

While the invention has been particularly shown and described with reference to particular embodiments, it should be understood by those skilled in the art that various changes in form and detail may be made without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is: